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## **Assessing access barriers to maternal health care: measuring bypassing to identify health centre needs in rural Uganda**

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**Background** In low income countries, several barriers exist to the use of health services for child delivery, including distance, transportation, informal costs or low perceived quality. Yet there is rarely information about which barriers are more or less important to the use of a given health facility. This study assessed the relative importance of different barriers to maternal health facility use in rural Uganda through the use of simple indicators based on locally available data.

**Methods** Data from public health facilities performing deliveries in a rural district were used along with census information to construct a set of indicators useful for diagnosing barriers to delivery service use. Indicators included the number of facility-based deliveries per 1000 women served, the proportion of users from a facility's local area, and a new indicator, the 'bypassing ratio', defined as the number of women from a facility's local area who delivered in other facilities, divided by the number of local women using the facility itself.

**Results** Numbers of deliveries varied greatly between facilities of the same level. A few very low use facilities saw over 75% of women come from the local area, while other facilities services attracted a large majority of women from other areas. The phenomenon of bypassing provides additional insight into the relative importance of distance or transport as opposed to internal facility factors preventing use.

**Conclusions** Simple and easily replicable tools are essential to assist health managers to identify communities and facilities needing improvements in access to delivery care. The methods developed in this paper could be utilized by local officials in other areas to assist planning and improvement of both maternal care and other health services.

**Keywords** Maternal health, access barriers, bypassing, Uganda, health service use

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#### KEY MESSAGES

Women often bypass local facilities to access delivery facilities farther away.

Assessing the proportion of women bypassing local facilities, or travelling to farther away facilities, helps identify which access barriers are faced by particular facilities.

Use of facility records and census data by local planners can help identify facilities in need of improvement or attention.

## Introduction

Improving the health of women during pregnancy and childbirth is an international priority and a Millennium Development Goal (United Nations 2005). Much of this improvement is expected to be achieved across low income countries, including those in Africa where nearly half of all maternal deaths take place (WHO 2005). In Uganda, the Maternal Mortality Ratio (MMR) was estimated in 2006 at 435 maternal deaths per 100 000 live births (Uganda Bureau of Statistics and Macro International Inc. 2007), showing little progress towards the government's own goal of reducing maternal mortality from 500 to 300 between 2001 and 2008. Many authors admit that achieving progress in reducing maternal death will be difficult (Mavalankar and Rosenfield 2005; United Nations 2005; Gyimah et al. 2006), with one recent United Nations report stating, 'based on trends during the 1990s, sub-Saharan Africa, the region with the highest levels of maternal mortality, is making almost no progress towards the [maternal health] MDG' (United Nations Statistics Division 2005, p. 2).

One of the primary means advocated to reduce maternal mortality is by increasing the number of women who deliver with a skilled birth attendant—i.e. a doctor or nurse/midwife (WHO et al. 2004)—which predominantly occurs in health facilities. In Uganda at the time of this research, only 39% of women delivered with a skilled attendant, slightly below the African average of 42% (Uganda Ministry of Finance and Economic Planning and Macro International Inc. 1996; Safe Motherhood 2001; Uganda Bureau of Statistics 2001). A number of barriers to the use of professional maternal health services have been identified, however, both internationally and in Uganda alike. These include: distance to facilities (or transportation problems), costs involved, perceived low quality of services, or socio-cultural norms against the use of services (Kutzin 1993; Thaddeus and Maine 1994; WHO 1998; Amooti-Kaguna and Nuwaha 2000; Bantebya Kymuhendo 2003; Ensor and Cooper 2004; UNFPA 2004a).

Studies identifying these barriers almost universally focus on non-users of facilities, typically only providing lists of potential barriers, with no attempt to estimate the relative importance of those identified. Furthermore, barriers may vary between facilities, and so assessment is further complicated by a need to gather information about specific health facilities. So while the typical barriers are known, there is little information available to local level planners or district health officials on how to identify which barriers to service use are important in an area, or crucially limiting the use at a specific facility.

To guide planning efforts, simple, locally practical indicators to identify which barriers may be problems for particular facilities are needed. Patterns of data from actual service users, and comparative use between facilities in neighbouring areas, may be one specific way to help in this process. This paper presents an example of how facility and local data can be used to help guide planners to know which barriers may be most important to particular facilities, through analysis of use rates and construction of a new indicator, termed the 'bypassing ratio'.

## Methods

The research described was part of a larger, mixed method, study investigating access and use of professional maternal care in low income settings (Parkhurst and Ssengooba 2005; Parkhurst et al. 2006). Fieldwork was undertaken in the predominantly rural district of Hoima, in the north-west of

Uganda. Hoima district is divided into two sub-districts and 11 sub-counties. Sub-counties are further divided into three to five parishes. Parishes are then divided into villages, the smallest administrative unit. The Ugandan health system is divided into five facility levels along similar lines, from local Health Centre I (serving villages), to district hospitals (Health Centre V). Services for normal (uncomplicated) delivery are offered at the Health Centre III (HC-III) level, which serves a sub-county (although some sub-counties have more than one HC-III). Complicated cases are typically referred upwards to a Health Centre IV (HC-IV), serving a sub-district, or to the district hospital.

Fieldwork was undertaken in 2003 by a team of Ugandan researchers recruited in the capital (Kampala) and trained by the authors in research methods and the goals of the study. In total 13 public HC-IIIs, two HC-IVs, and the district hospital were visited in Hoima district. The data collected consisted of:

- ◆ Number of deliveries (normal or complicated) in the preceding 12 months in each facility (from facility aggregate records);
  
- ◆ Number of deliveries each month in the same period (from individual patient forms);
  
- ◆ Home village of each woman who delivered in the facilities (from individual patient forms);
  
- ◆ Staff numbers in each facility (from interviews);
  
- ◆ Availability of key drugs and supplies in each facility (from interviews and stock checking).

District-level data were further obtained in the form of:

- ◆ Female populations of villages, parishes and sub-counties (from census data);
  
- ◆ Village locations, in terms of the administrative unit they fall into, by parish and sub-county (from administrative records).

Results

Table 1 presents data on normal (not listed as complicated) deliveries from all public facilities in the district for the preceding 12 months (referral facilities at level HC-IV or higher are italicized). Higher use of HC-IVs and Hoima Hospital was expected, due to their greater staffing and serving a wider area, but numbers of deliveries in HC-IIIs varied greatly. Numbers ranged from as few as 12 in the preceding year, to as many as 560. Even when weighting this by population served, there is a great variation in deliveries, from less than 1 delivery per 1000 women in the sub-county, to over

20. Kigorobya HC-III is particularly interesting due to the sheer number of deliveries it sees. It was unclear why this was the case on first inspection. Census data show it serves a female sub-county population nearly twice that of many others, yet on its own this would only partially explain its high attendance.

Such findings appear to illustrate high popularity of a few key facilities, and low popularity of others. However, there are many possible barriers to the use of services beyond their perceived popularity. Distance and transportation problems in particular may affect utilization rates, and so it is important to look beyond simple use rates to help guide policy on where improvements are needed.

#### Deliveries from a local area

A second piece of information analysed was to look at the proportion of women using a facility who came from the local

#### Table 1 Deliveries in Hoima district public health centres

parish. Facility records do not include distance travelled, but they do record the home village of the patients. All delivery records over the past 12 months were reviewed, with a tally kept of how many women came from each village. This was then combined with administrative information to look at what proportion of deliveries in each facility came from villages located in the same parish as the facility.<sup>1</sup>

Table 2 illustrates the proportion of deliveries from the local area for each HC-III. Figure 1 presents these data as a scatter plot comparing number of deliveries with proportion from the area. For facilities conducting fewer than 50 deliveries per year, a large majority of those deliveries were women from the local parish. For the one HC-III conducting a large number of deliveries (over 550), under 10% of those women came from the local parish.

Looking at this indicator in combination with the number of deliveries can help illustrate the importance of distance or transportation barriers with regard to others which could be classified as 'internal' barriers to the facility influencing its popularity (such as perceived low quality, or informal costs charged in a facility). In general it appears that many people travel outside their local area to reach the more popular services, which would indicate transportation is not necessarily as important as the perception of the facility. However, it is unknown how far the average travel distance was, as these data were not available.

#### Bypassing

Willingness to travel appears to be linked with the popularity of the service, but this finding in itself still leaves unclear how much of facility utilization can be attributed to ease/difficulty of

transportation from surrounding areas, as opposed to internal factors affecting the popularity of the facilities. However, it was also possible from the data to calculate the proportion of women who lived in a parish served by a Health Centre who

Parish female Deliveries Sub-county Sub-county female population Number of (normal) per 1000 women Health centre name population (2002) Parish name (2002) deliveries, past 12 months in the sub-county

**Table 1** Deliveries in Hoima district public health centres

Health centre	Sub-county name	Sub-county female population (2002)	Parish name	Parish female population (2002)	Number of (normal) deliveries, past 12 months	Deliveries per 1000 women in the sub-county
Dwoli HC-III	Kitoba	16 291	Kiragura	3771	12	0.74
Mparangasi HC-III	Kyabigambire	14 713	Kibugubya	3810	119	8.09
Karongo HC-III	Kitoba	16 291	Karongo/Budaka	2487	13	0.80
Kabwoya HC-III	Kabwoya	12 914	Bubogo	3124	203	15.72
Buraru HC-III	Kyabigambire	14 713	Buraru	4995	53	3.60
Bujalya HC-III	Buhimba	14 427	Musaijamukuru East	2358	36	2.50
Buhimba HC-III	Buhimba	14 427	Kyabatalya	3129	70	4.85
Buhanika HC-III	Buhanika	9995	Buchunga	2453	31	3.10
Mukabala HC-III	Kiziranfumbi	10 698	Bulimya	4660	80	7.48
Kigorobya HC-III	Kigorobya	25 508	Kigorobya Town	2016	560	21.95
Butema HC-III	Buhanika	9995	Butema	2808	213	21.31
Buseruka HC-III	Buseruka	11 938	Nayakabingo	3423	144	12.06
Bugambe HC-III	Bugambe	12 404	Bugambe	1803	163	13.14
<i>Kyangwali HC-IV</i>	<i>Kyangwali</i>	<i>19 059</i>	<i>Kyangwali</i>	<i>3178</i>	<i>269</i>	<i>14.11</i>
<i>Kikube HC-IV</i>	<i>Kiziranfumbi</i>	<i>10 698</i>	<i>Bulimya</i>	<i>4660</i>	<i>384</i>	<i>35.89</i>
<i>Hoima Hospital</i>	<i>Hoima Town</i>	<i>15 000</i>	<i>n.a.</i>	<i>n.a.</i>	<i>2531</i>	<i>168.73</i>

**Table 2** Percentage of deliveries from within the parish served

HC-III	Number of deliveries (attributable to a village*)	Deliveries from the parish	Proportion from the parish (%)
Dwoli	12	n.a.	n.a.
Mparangasi	119	39	32.77
Karongo	12	7	58.33
Kabwoya	203	69	33.99
Buraru	42	33	78.57
Bujalya	36	28	77.78
Buhimba	70	13	18.57
Buhanika	31	25	80.65
Mukabala	74	18	24.32
Kigorobyia	552	46	8.33
Butema	213	118	55.40
Buseruka	144	88	61.11
Bugambe	163	30	18.40

\*Some patient records had no village listed. In such cases, the record was excluded from the analysis. This accounts for the lower number of deliveries for some facilities compared with Table 1. The exception is Dwoli where no villages were listed for any of the 12 deliveries.

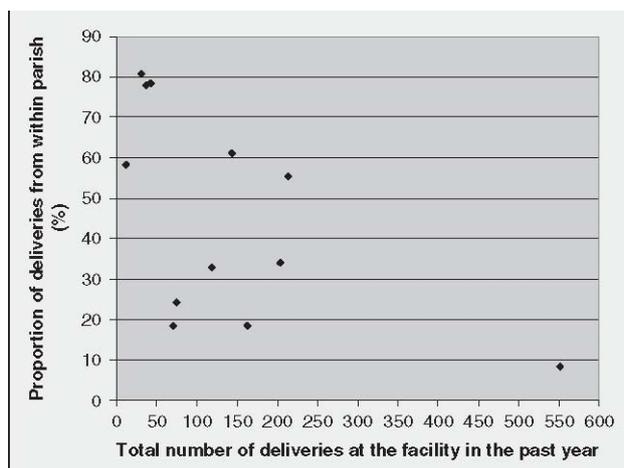


Figure 1 Proportion of deliveries from the local area (each point represents one facility)

did not go to the local facility to give birth, but instead travelled outside their parish to another Health Centre. This has been termed the 'bypassing ratio', to indicate where individuals travel past one health centre to reach a farther one. Bypassing has been described elsewhere (Akin and Hutchinson 1999), and can present a picture of the relative importance of transportation versus popularity, showing when individuals are willing and able to overcome distance issues to reach more desirable services.

Calculation of the bypassing ratio requires data from all facilities serving a district, including higher-level referral facilities. The following steps were taken:

1. Identified the parish location of the Health Centre (HC) of interest;

Table 3 Bypassing of local services

**Table 3** Bypassing of local services

Health Centre III	Deliveries (past year) [D]	Deliveries from the local parish [D]	Number of women from parish served who delivered elsewhere [E]	Bypassing ratio of deliveries [BR = E/D]
Dwoli	12	n.a. (maximum could be 12)	62	n.a. (but minimum of 5.17)
Mparangasi	119	39	32	0.82
Karongo	13	7	24	3.43
Kabwoya	203	69	1	0.01
Buraru	53	33	24	0.73
Bujalya	36	28	17	0.61
Buhimba	70	13	66	5.08
Buhanika	31	25	43	1.72
Kigorobya	560	46	69	1.50
Butema	213	118	0	0.00
Buseruka	144	88	5	0.06
Bugambe	163	30	7	0.23

Number of Deliveries women from Bypassing from the parish served ratio of

Health Deliveries local parish who delivered deliveries Centre III (past year) [D] elsewhere [E] [BR  $\frac{1}{4}E/D$ ]

- 1 Identified the villages located within that parish;
- 2 Counted the number of deliveries to the HC which came from villages within its parish ( $\frac{1}{4}D$ );
- 3 Counted the number of deliveries in all other facilities which came from villages in the local parish of the HC of interest ( $\frac{1}{4}E$ );
- 4 Divided E by D to calculate the bypass ratio (BR  $\frac{1}{4} E/D$ );

A bypassing ratio of over 1.0 would indicate that a majority of women from the local area who delivered in a health facility travelled outside the area to another facility. A ratio under 1.0 indicates that most local women seeking facility care came to the local facility.

Table 3 shows the extent of bypassing across the HC-IIIs in this study. Excluded from the table is Mukabala HC-III, which was located in the same sub-county as a larger HC-IV which would be serving the population of Mukabala's parish frequently.

Graphically, the bypassing ratio compared with total deliveries can be shown as in Figure 2. The steepness of any curve fit to the data on bypassing provides insight into the importance of distance and transportation as barriers. A steep decline, like that seen here, indicates that women will only bypass services (and undertake lengthy transport) for a few unpopular centres. A high bypassing ratio for an individual facility could mean there are significant barriers originating within the facility (poor quality, high informal charges, or possibly limited opening times, for example). It is important to note, however, that the bypassing ratio and number of deliveries are not independent, as the bypass ratio uses the number of local deliveries, a component of the total number of deliveries, in its calculation outlined above.

Three facilities (Dwoli, Buhimba and Karongo) stand out in the very large bypassing ratios. All of these facilities, however, were found to lie on major roads leading to Hoima town, with

Dwoli and Karongo lying in sub-counties adjacent to Hoima town. Further analysis also shows that most of the women who bypassed facilities did so to visit higher-level facilities. Of 589 cases in total, 114 bypassed to reach a HC-IV and 425 bypassed to reach the district hospital at Hoima. Kigoroby, with its very high number of deliveries had a moderate bypassing ratio. It also lies on a major road to Hoima, although further away from Hoima town than several other facilities.

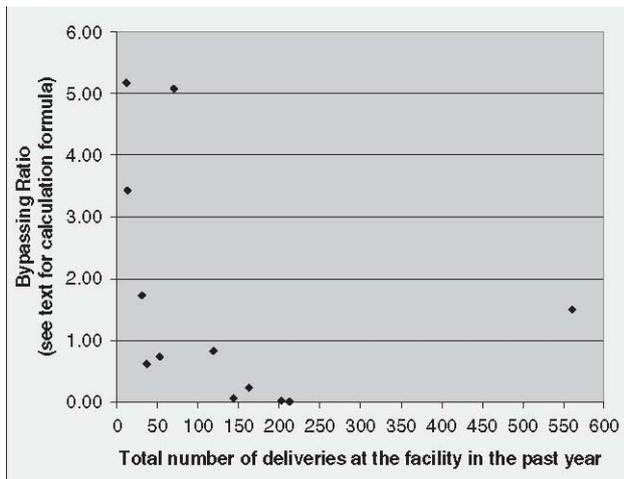


Figure 2 Bypassing ratio by number of deliveries (each point represents one facility)

#### Guidance for health planners

The number of deliveries, proportion from the local area, and the bypassing ratio can be used to give an indication of the importance of distance compared with internal factors (such as quality or possible cost due to informal charges) when it comes to decisions about which facilities to visit for child delivery. Comparing local facilities using these three factors can help to identify potential explanations and insights into the barriers particular facilities may present to individual women seeking to deliver there. It sheds light on the choices communities seem to have among facilities, and may help identify which choices appear to be available to them, as illustrated in Table 4.

In this way, using routinely available local data from hospital records and census information, it was possible to draw preliminary conclusions about which barriers are more or less important in particular health facilities. These figures cannot determine precisely what factors are driving the patterns of delivery care usage, but they provide potentially useful information for support supervision, planning and identifying facilities and communities where further operational research would help to address access to delivery care.

Planners will most likely wish to combine such results with understandings from local knowledge or further investigation. When poor transportation arises as a possible factor (such as in the first and fourth row in Table 4), investigation can look at road access for that region, density of public transportation options or road quality to verify the importance of this factor. Similarly, when service

quality or cost factors may be the explaining variable, investigation may be warranted into the factors internal to the facility.

Table 4 Relationships between deliveries, local deliveries, and bypassing

It should be noted, however, that while the bypass ratio can be used to identify the relative importance of different barriers between facilities, it may be limited in identifying the key barriers to all women in the communities served, as it relies on data from service users who may not be perfectly representative of all women. The 2000–2001 Demographic and Health Survey, for instance, reported that while the national average of delivery in facilities was 39%, this was highly skewed by wealth. Seventy-six per cent of Ugandan women in the highest wealth quintile (measured through an assessment of household assets) delivered in facilities, compared with only 18.4% in the lowest wealth quintile. Similarly, data show that women of higher educational achievement were more likely to deliver in facilities (Uganda Ministry of Finance and Economic Planning and Macro International Inc. 1996).

While women across Hoima district may face similar barriers, wealth clearly affects the ability to pay for any costs faced, and more educated women may be more independent from social pressures of home delivery. Hoima is a relatively rural district, and not expected to see the extent of income inequality typically found in large urban areas, but it still may have relatively wealthy families who access services most. In the end, it is necessary to make additional efforts to investigate the relative importance of barriers and ability to overcome them for the entire population served. We would therefore recommend a combination of information to inform planning, focusing both on facility data such as these, combined with more structured assessment of barriers among non-users

Number of deliveries	Proportion from local area	Bypass ratio	Potential explanations	Examples
Low	High	Low	-Poor transportation -Low quality or high cost -Distance may be more important a barrier than quality/cost for many women	Bururu, Bujalya
Low	Low	High	-Good transportation -Low quality or high cost -Quality/cost more a barrier	Buhimba
Low	High	High	-Good transportation -Poor quality or high cost -Quality/cost more a barrier	Karongo, Buhanika

(perhaps attempting to rank rather than just list barriers) to ensure that health centre improvements address the needs of the whole community served.

#### Internal facility indicators

Past studies have stated that one of the most important aspects for facility users in Africa is the stock of drugs available (Jitta et al. 2003). Therefore, in addition to service use statistics, facilities were surveyed for their availability of key drugs and supplies, as well as staff numbers, to see if there were obvious differences between facilities that might explain their desirability to potential users. Questions were asked about the availability of 14 key drugs and 29 supplies including items of equipment. However, there was little obvious correlation found between drug or supply availability and numbers of deliveries. Three facilities had seven drugs missing, but delivery numbers varied from 36 to 203. The facility with the least number of drugs and supplies missing (Bugambe) had very similar numbers of deliveries to one with a high number of drugs and supplies missing (Buseruka).

There may be problems, however, in the assumption that number of drugs or supplies available at any given point in time is equivalent to the quality of care received, or even to the availability of those drugs to patients. Popular health centres (possibly of higher quality) may exhaust supplies more quickly, or poor quality facilities may not use their stocks at all. Concurrent qualitative interviews with women who had recently delivered in the district (Parkhurst and Sengooba 2005) also indicated that women were asked to bring their own medications and supplies like gloves. A better indicator of quality could be the proportion of women who are actually

provided drugs/supplies by the facility, but this would be very difficult to measure accurately.

Staff numbers were also found to be fairly similar across facilities, with between one and three midwives in each facility. These levels indicate great variation in numbers of deliveries per midwife in the facilities, ranging from 12 to as many as 213 per midwife per year. Even if clinical officers also regularly undertake deliveries (which was not authorized in Uganda at the time of the research), the more popular facilities would clearly have difficulty in providing full-time delivery services over the course of a year given their high demand.

Although highlighted in some studies as particularly important to service users, staff numbers, drugs and supplies only represent some of the more easily quantifiable elements influencing the perceived quality of services. Another important factor may include the handling of patients by staff. Indeed, past work has highlighted problems of abuse of patients by maternal health staff in both Uganda (Bantebya Kymuhendo 2003) and elsewhere (Jewkes et al. 1998).

Finally, another factor that can affect use of a particular facility is costs charged. In Uganda, maternal health care is meant to be free. As such, expenses accrued tend to be classified as 'informal' costs—payments made unofficially, or expenditure on drugs or supplies intended to be free (McPake et al. 1999; UNFPA 2004a). Our survey within facilities did not assess such charges, as it was assumed that staff reports of informal fees would be highly biased. Planners concerned with the assessment of informal costs would most likely need to survey recent users to obtain such data.

#### Data limitations

Some limitations to the data must also be acknowledged. In the analysis above, the number of deliveries from local areas was used, which was obtained by identifying home villages and the administrative districts in which they fell. However, village names are at times repeated in the district. As such, in some cases it was not clear which exact village was indicated. A few facility records did not have village names included. In such cases, these records were excluded from the analysis. More importantly, it was also not possible to know with certainty if the address listed in the facility records was where the patient actually travelled from to reach the health centre. It is known in Uganda that some women will travel to a relative's home before childbirth. It would be possible, for example, that a woman from one sub-county would visit a distant facility simply because she had moved to her parents'/relative's home before going into labour. Such information is not recorded in facilities, however, and while it could cause some bias in the data (raising the bypassing ratios), it would be expected to affect all facilities relatively equally. Furthermore, qualitative investigation undertaken in this area as part of a larger study found that most of the women interviewed who delivered in a facility had planned to do so in advance, and travelled from their own homes (Parkhurst and Ssengooba 2005).

Being a relatively small-scale study, it was not possible to undertake detailed assessments of estimated costs between facilities, or other elements which make up perceived quality of care such as staff handling of patients. In some cases there may be clear issues (such as verbal or physical abuse) which

particularly undermine quality of particular facilities, but a better assessment of these internal factors could require additional information obtained through surveys of recent service users, for instance.

Finally, calculation of the bypassing ratio will be biased if a significant number of women deliver in other districts or private facilities. Health planners may wish to include records from private facilities to see if women bypassed local health centres for those as well. The inclusion of such additional facilities would be at the discretion of the local managers, and others with a mandate to improve access to delivery services. The bypassing ratio alone also does not say much about local peoples' relative means to bypass. If communities in certain areas were wealthy and could afford transportation easily, it could theoretically lead to higher levels of bypassing for those groups. Again, local knowledge would be crucial for interpretation of data produced by these methods.

## Conclusions

Improving maternal health requires a range of interventions across a health system (AbouZahr 2003; UNFPA 2004b), but one key strategy is to increase the number of women delivering with a skilled birth attendant, often done in health facilities. Barriers against use of services include internal factors such as the popularity of the facility (which may reflect perceived quality of care or costs incurred by users), as well as external barriers such as distance and transportation problems. As a result of differences in these barriers, certain facilities may be utilized dramatically more than others, even within a reasonably small geographic area such as a district (where sociocultural norms of facility use may be fairly homogenous). As a result, some facilities are underutilized for essential delivery care, while others are over-stretched with too many deliveries for the few midwives available.

Local planners and health officials need to be able to identify those facilities which are in need of improvements, but simply counting numbers of deliveries alone may not indicate which barriers are particularly problematic or what interventions hold potential remedy. This paper has illustrated how facility records and administrative data can be used in combination to develop indicators such as the bypassing ratio, which give more directed guidance to identify the particular barriers facilities and communities may face to access delivery care. Planners, however, will also need to take into consideration those elements here classified as 'internal' to facilities, which may greatly affect perceived quality of care. The bypassing ratio would most likely be used in conjunction with such other information. Perhaps easiest to assess are drug and supply stocks, or staff—found in previous work to be of particular importance to patients in Africa. Yet this study found that levels of drugs and supplies available in facilities was not correlated with utilization, possibly due to popular facilities exhausting supplies, or simply the fact that women may be asked to bring their own supplies regardless of stocks available. Staff numbers did not vary considerably between facilities, although time spent in post was not assessed and could be important. Other factors affecting perceived quality such as

staff–patient interactions and informal costs may require more nuanced investigation.

However, the tools described here can help guide district health managers to identify key barriers to the use of maternal health services at a facility level, particularly the importance of distance and transportation vis à vis other issues. Ultimately, using information to identify facilities facing particular barriers can help inform the planning and resource allocation processes to increase utilization of professional services, with subsequent impacts on health outcomes.

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#### Endnotes

<sup>1</sup> Similar analysis could be done looking at the proportion which came from the sub-county served, but it was not known if some villages in one sub-county might have been closer to a HC-III technically serving another sub-county. As such, parishes were used to emphasize the local proximity to the facility in question.

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